

## REMARKS/ARGUMENTS

Claims 21 - 26 remain in the application.

Original claims 1 -20 and 27 – 33 have been canceled

Original claims 21 – 26 were rejected under 35 USC §102(b) as anticipated by U.S. Patent No. 4,290,486 to J.A. Regalbuto.

The Regalbuto patent discloses an explosive pipe or tubing cutter construction wherein high explosive elements of the construction are combined as an independent sub-assembly. The Regalbuto explosive sub-assembly comprises a plurality of explosive wafers 66/72 stacked serially between a pair of end plates 24/46. The end plates are mechanically secured to respective distal ends of a "fuse tube" 32 that extends through apertures in the explosive wafers. There is no resilient bias on the explosive subassembly. The explosive wafer filled length along the fuse tube 32 is set at an inflexible distance between the inner faces of the charge support plates 24 and 46. Both charge support plates 24 and 46 are mechanically secured to the fuse tube 32 by respective set screws 34 and 52. The only electrically initiated detonator in the Fig 1 Regalbuto embodiment is the detonator 114 secured within the housing end plug 106. The electrical detonator 114 ignites the fuse detonators 96/98.

Responsively, the fuse detonators 96/98 ignite the fuses 102/104. Explosive detonators 40/54 are mechanically secured within the respective end plate structures 24/46. Respective fuses 102/104 are attached to the detonators 40/54 **before** the explosive sub-assembly is inserted into the bore space of a cylindrical housing 12.

The Fig 7 Regalbuto embodiment discloses a pair of electrically discharged detonators 174 and 176 at opposite ends of an explosive column. However, the explosive column is not compressed by a resilient bias nor is it unitized about a central rod. Furthermore, no capacitative firing cartridge is provided within the tubular housing of Regalbuto

Applicant's **claimed** invention (amended claim 21) is directed to an apparatus for severing a length of pipe comprising several essential characteristics:

- (1) a tubular housing having a barrel space between a resiliently biased detonator housing and a selectively removable end plug;
- (2) a first electric detonator positioned in the detonator housing to resiliently bear upon one end of the explosive column;
- (3) a second electric detonator positioned in the end plug to bear upon the other end of the explosive column;
- (4) a capacitative firing cartridge within the tubular housing; and,
- (5) electrical conduits between the capacitative firing cartridge and the electric detonators that need not be disconnected when the end plug is detached from the tubular housing for inserting or extracting an explosive column.

There are several unobvious advantages to the synergistic combination described by Applicant's amended claim 21, one of which is found in Applicant's specification ¶ [0023].

"An unusually high voltage surge is required to detonate the EBW detonator (or EFI).... The system is relatively impervious to static discharges, stray electrical fields and radio frequency emissions".

Other unobvious advantages to the combination are described in specification ¶ [0026] and [0027].

"it is a design intent for the invention to obviate the need for field connections. Without explosive pellet material in the outer housing bore 14, EBW detonators 32 and 66 are the only explosive material in the assembly..... Consequently, without explosive material in the tubing bore 14, the assembly as illustrated by FIG.1 is safe for transport with the EBW detonators 32 and 66 connected in place.

The significance of having a severing tool that requires no detonator connections at the well site for arming cannot be minimized."

These characteristics of Applicant's invention permit the cutter housing to be constructed and primed prior to transport from a remote assembly plant. The only

electrical connection that must be made at the well site is to the wire-line conductor.

The explosive column of Applicant's invention is an assembly of numerous, small value, explosive pellets that may be safely transported as separate packages. At or near the well site, a precisely prescribed number of the pellets may be structurally combined as a singular unit prior to combination with the pre-primed housing. This structural combination of pellets is performed independently of the housing for absolute visual verification that the correct explosive value and alignment relationship between the pellets is assembled. Notably, the assembled column of high explosive pellets has no proximate detonation means until actual and final insertion into the housing barrel.

The claim 21 definition of Applicant's invention differs in numerous small respects from the disclosure of Regalbuto. The most significant difference, however, is Applicant's structural combination of electrical detonators, a capacitive firing cartridge and an independently assembled column of explosive pellets. The novel cutter housing of Applicant's independent apparatus claim 21 is directed to a novel cutter housing construction that connects capacitive firing cartridge to two detonators in the housing for engaging opposite ends of an explosive column. Distinctively, one of the two detonators is secured to a housing end closure and the other secured to a spring biased detonator housing that bears against the explosive column to press the column of explosive against the end closure.

The Regalbuto patent, on the other hand, describes an electric detonator 114 secured to a removable housing plug 106 without benefit of a capacitance trigger. Regalbuto also describes fuse detonators 96/98 secured to a closure plate 86. The fuse detonators 96/98 are initiated by the electrical detonator 114. Neither of the Regalbuto fuse detonators 96/98 or 114 engage an explosive column. The fuse detonators 96/98 only ignite respective fuses 102/104 which, in sequence, ignite explosive detonators 40 and 56. Regalbuto, column 5, lines 11 – 15. Conversely, neither of the Regalbuto detonators 40 or 56 that do engage an explosive column may be characterized as compressed or positioned by a resilient bias. The explosive column of Regalbuto is of fixed dimensional length between structurally secured end plates 24 and 46.

Applicant's independent apparatus claim 21 further distinguishes the invention characteristics by specifying an electrical continuity between the explosive detonators and the capacitative firing cartridge that is sustained during displacement of the barrel end-cap. Although the electrically initiated end-cap detonator 114 of Regalbuto may be detached from the tubular housing, the detonator 114 does not engage the explosive column. Those Regalbuto fuse initiated detonators 40 and 54 that do engage the explosive are not electrically initiated and have no electrical continuity between them. Significantly, Applicant's invention eliminates the necessity electrically connecting detonators under environmental conditions that are oftentimes stressful. With Applicant's invention, the detonators may be secured within the housing at the housing construction site. No field connection of internal wiring is necessary.

In view of the present amendments and arguments presented herewith to distinguish Applicant's claimed invention over the cited prior art, Applicant respectfully requests the Examiner's favorable reconsideration and allowance of claims 21 - 26 as patentably novel over the prior art.

Respectfully Submitted,

  
W. Allen Marcontell

Reg. No. 22,925

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W. Allen Marcontell